

# HOW why WHEN

49¢



OVER A THOUSAND QUESTIONS  
AND ANSWERS  
THAT WILL INTEREST  
ALL CHILDREN



# HOW - WHEN AND WHY

*By*

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OTTENHEIMER PUBLISHERS, INC., BALTIMORE, MD.

Printed in U.S.A.



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# THE STORY OF LIFE

## HOW WAS THE EARTH FORMED?

There are many different theories of how the earth came into being. However, they are only theories or guesses, and scientists admit that no one really knows how the earth was formed. We'll tell you about one theory and you may read about the others at some other time.

It is believed that about two billion years ago, the solar system and the planets came into existence through a rare, freak accident. Astronomers believe that at that time the sun was much hotter and rotated much faster than it does today. All at once a great flaming star flashed out of the infinite blackness and rocketed madly across the sky, headed straight for the sun. Luckily this wandering star did not crash into the sun, instead, by its own magnetic suction, it stirred up great waves of molten matter and fragments from the sun's surface (Fig. 1). These huge fragments tumbled and whirled through space with the great roving star. As the huge star sped further and further away from the sun, its magnetic power on the fragments lessened, and the fragments were pulled back by the sun's greater attraction. And their paths were set in fixed orbits or paths, revolving around the sun. These fragments became the nine planets, including the earth, that we know about today (Fig. 2). The huge ball of fire that became the earth, plummeted down over ninety-three million miles through space. Suddenly the huge flaming



FIG. 1



FIG. 2.



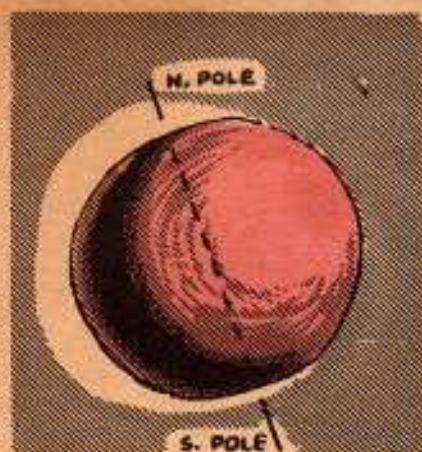


FIG. 3.

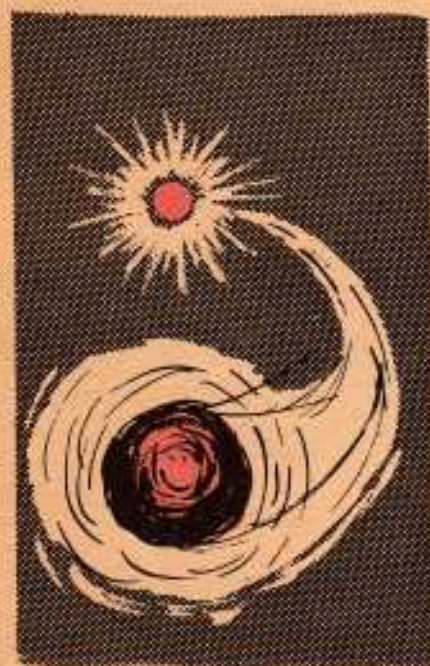


FIG. 1.



FIG. 2.

ball was stopped right in its tracks, and it, too, was pulled into a fixed orbit by the magnetic force of the sun, along with the rest of the planets.

Time passed, and as the earth rotated it started to cool and to shrink in size. Due to its rotation, it formed into a huge ball slightly flattened at each end. These ends became the north and the south poles by which the earth rotates on its axis (Fig. 3). As it cooled, the huge ball started to harden and a thick crust formed on its surface. Great masses of molten matter, filled with metals and minerals, floated around it. Billions of years later these metals and minerals were withdrawn from the earth by man.

#### HOW WAS THE MOON FORMED?

At the same time about 240,000 miles from earth, a much smaller fragment was tossed off by the sun (Fig. 1). This fragment also spun and whirled through space. As it spun it cooled, and burned. And very quickly it burned itself out. This became the cold, lifeless satellite of the earth that we call the moon (Fig. 2). The surface of the moon is irregular and contains many depressions or craters (Fig. 3).

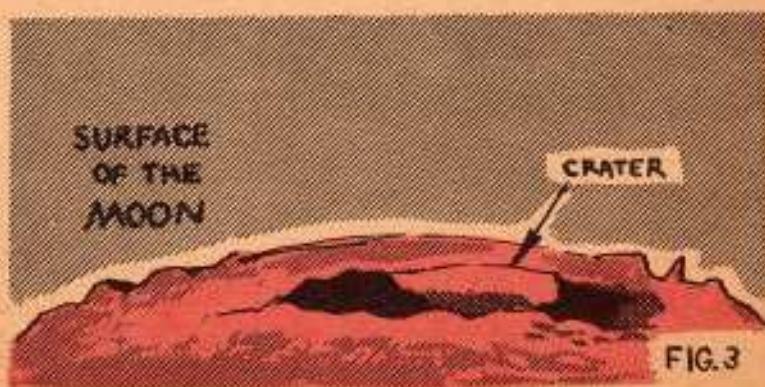


FIG. 3





FIG. 1

### HOW WERE THE SEAS FORMED?

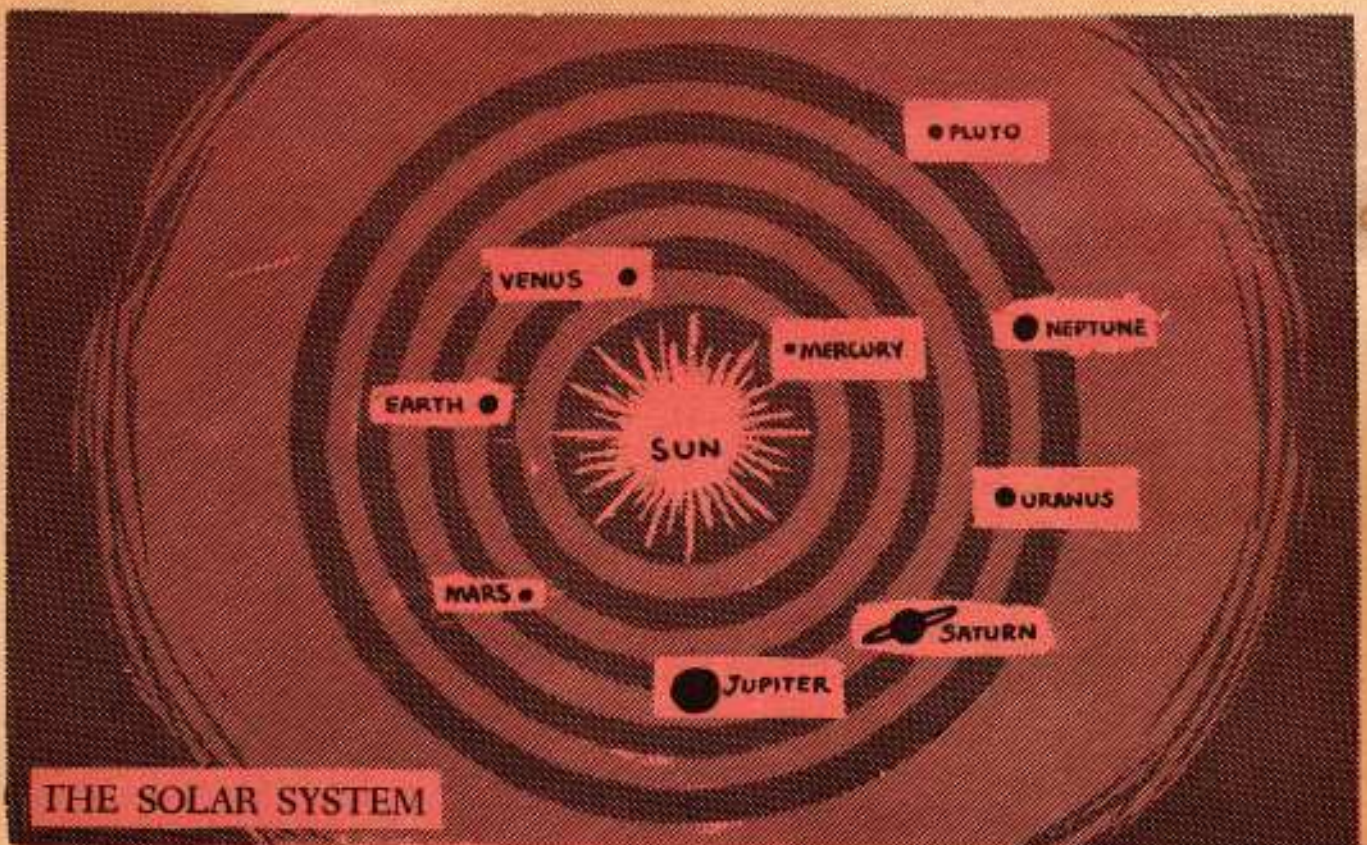
As we learned before, the earth was surrounded by a molten mass of hot steaming vapor. This boiling vapor was inside of the earth, too, causing great convulsions (Fig. 1). As the convulsions within the earth subsided, the vapor rose from the earth, condensed, and formed rain. The rain poured down on the hot flaming earth and cooled it. As the rain cooled the earth, it filled the huge depressions and hollows of the earth's surface caused by the convulsions. These filled hollows on the earth's surface became the seas (Fig. 2).



FIG. 2.



# ALL ABOUT THE HEAVENS



THE SOLAR SYSTEM

1. WHAT IS THE DIFFERENCE BETWEEN ASTROLOGY AND ASTRONOMY?

Astrology is the parent of astronomy and deals with the belief that all human events are predicted by the position of the heavenly bodies. Astronomy is the science that deals with the heavenly bodies.

2. WHAT IS THE SOLAR SYSTEM?

The solar system is a vast system of heavenly bodies, the center of which is a great star we call the sun. Around the sun revolve the nine planets with their moons, asteroids, meteoroids and comets.

3. WHAT IS THE MILKY WAY?

The cloudy track of light we see stretched across the heavens, when we look at the sky on a clear night, is called the Milky Way. It is filled chiefly with a stream of distant stars.



## ALL ABOUT THE PLANETS

### 1. WHAT IS A PLANET?

The word planet, is a word taken from the Greek, and means wanderer. Planets are huge bodies having no light or heat of their own. They reflect the light of the sun, and those planets closest to the sun are heated by the sun's rays.

### 2. HOW MANY PLANETS ARE THERE?

There are nine planets, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto. They were named after ancient gods.

### 3. WHAT IS THE LARGEST PLANET?

Jupiter is by far the largest planet, and is second in brilliancy to Venus. It has its orbit outside that of the earth.

### 4. WHAT IS THE SMALLEST PLANET?

Mercury is the smallest planet in the solar system. It is nearest to the sun.

### 5. WHAT IS THE NEAREST PLANET?

Mars is nearest to the earth, and more closely resembles the earth than any other planet. When Mars comes nearest to the earth its distance from us is 35,000,000 miles.

### 6. WHAT IS THE FARTHEST PLANET?

Pluto is farthest from the sun. The distance between the sun and Pluto is 3,670,000,000 miles. It is ninety-seven times as large as the earth.

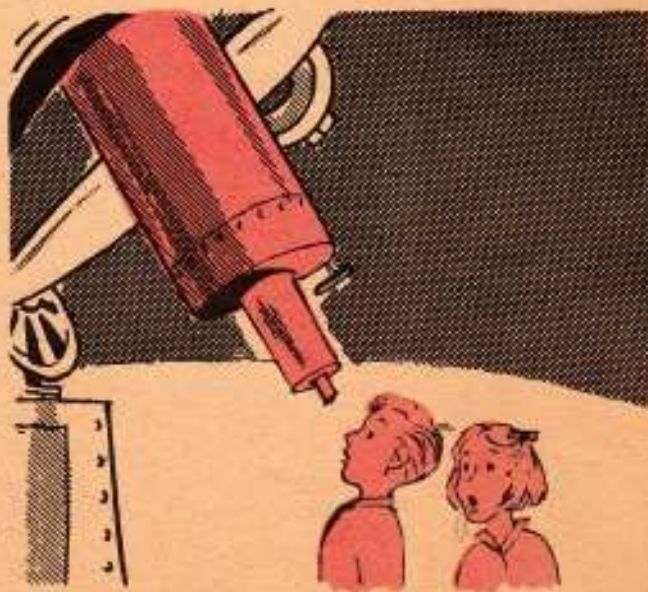
### 7. WHAT IS THE BRIGHTEST PLANET?

Venus is the most brilliant of all the planets.

### 8. IS THERE ANY LIFE ON THE PLANETS?

It is impossible to say whether or not life exists on the terrestrial planets, Mercury, Venus, Mars, and Pluto, for these planets are much like the earth.

However, it seems unlikely, as the freezing temperature and lack of oxygen would not be suitable for life as we know it.





## ALL ABOUT STARS



### 1. WHAT ARE FIXED STARS?

The so-called fixed stars are those that remain in the same position night after night, only changing their position when they reach the meridian.



### 2. HOW MANY STARS CAN WE SEE?

We are able to see about 3,000 stars with the naked eye, though not all of these are visible at the same time.



### 3. WHAT MAKES THE STARS TWINKLE?

We see the stars through atmosphere which is why they seem to twinkle. In reality they shine with a clear, steady light.



### 4. WHAT IS A SHOOTING STAR?

A shooting or "falling" star, is not a star at all. If we could see a shooting star before it started to "shoot" it would look like an ordinary stone. Thousands and thousands of these stones float around in space, always cold and without light. As the stones get close to the earth, the earth attracts them and they fall very fast. The speed with which they fall causes them to get very hot and they start to glow. Most of the stones are so small, and they get so hot, that they burn up before they strike the earth.



### 5. WHAT IS A METEOR?

The larger of the stones shooting toward earth do not burn up so quickly, and have a better chance of reaching earth. These stones that finally arrive on earth are called meteors.



### 6. DO THE STARS HAVE DIFFERENT COLORS?

Many of the stars shine with colored lights, as red, green, yellow and blue. In a few cases stars have a double color like blue and yellow, and green and yellow.



### 7. WHAT ARE THE BRIGHTEST STARS?

The brightest stars are Sirius, Arcturus and Vega.





## ALL ABOUT THE MOON

### 1. WHAT IS THE MOON MADE OF?

In substance the moon is not very different from the earth. It's the earth's closest neighbor, at times only 220,000 miles away.

### 2. DOES THE MOON ROTATE?

The moon spins much slower than the earth and turns around only once during the whole time it takes to travel around the earth.

### 3. DOES ANYBODY LIVE ON THE MOON?

We know definitely that there can be no life on the moon, for the moon is without air and water. What appears to be a face on the moon are the mountains, craters and vast plains we know exist on its surface.

### 4. WHAT IS THE RELATION BETWEEN THE MOON AND THE TIDES?

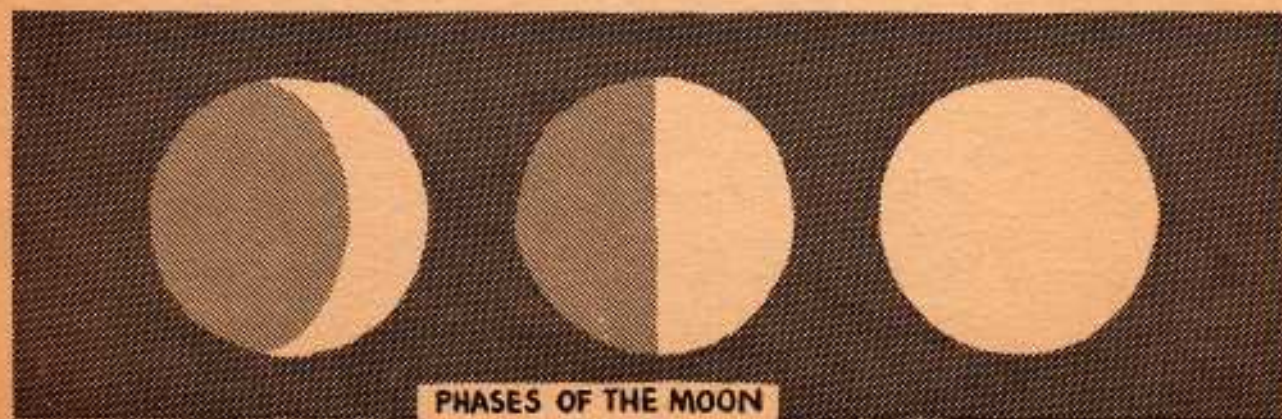
For many years it has been known that the moon has an effect upon the tides, and may perhaps have an effect upon the winds. That is why the study of the moon has been of such importance to navigators.

### 5. WHAT ARE MOONBOWS?

The arc of light that is reflected when the moon shines through a sheet of falling rain is a moonbow.

### 6. WHAT IS A LUNAR ECLIPSE?

A lunar eclipse occurs when the earth is between the moon and the sun in a line. Because the moon lies in the shadow of the earth, it is temporarily blocked out and we cannot see it.





## ALL ABOUT THE SUN

### 1. WHAT IS THE SUN MADE OF?

The sun is a huge ball of glowing gas. No part of the sun is solid, yet due to the immense pressure of the gas inside the sun, it is believed to be more dense than any solid known.

### 2. HOW FAR AWAY IS THE SUN?

The distance of the sun from the earth is about 92,800,000 miles.

### 3. HOW LARGE IS THE SUN?

The diameter of the sun is 866,500 miles.

### 4. DOES THE SUN ROTATE?

The sun rotates in the same direction as the earth. At the same time it moves through space at the rate of 12 miles per second.

### 5. WHAT IS A SOLAR ECLIPSE?

When the moon casts its shadow on the earth cutting off the rays of the sun, we have a solar eclipse.

### 6. CAN WE FORETELL AN ECLIPSE OF THE SUN?

As the heavenly bodies in their movements, follow a set pattern, we can tell the time when the moon will come between the earth and the sun, cutting off the sun's rays and causing an eclipse.

### 7. HOW DOES THE SUN MAKE A RAINBOW?

A rainbow is produced by the bending and reflection of the sun's rays when they are shining on raindrops in the sky. Rainbows always appear in the sky opposite the sun. And the higher the sun is in the sky, the smaller the rainbow. The colors of the rainbow are red, orange, yellow, green, blue, violet and reddish-blue.





# ALL ABOUT THE EARTH

## 1. HOW OLD IS THE EARTH?

The age of the earth, based on radio-activity, is believed to be from 1,500,000,000 to 3,000,000,000 years old.

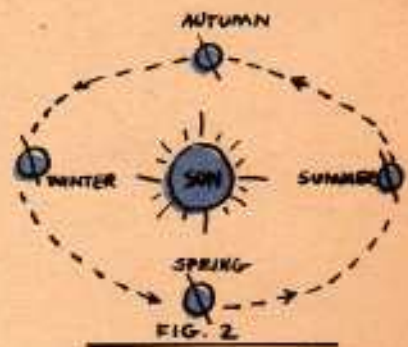
## 2. WHAT IS INSIDE THE EARTH?

The interior of the earth is believed to be filled with hot, gaseous matter. The reason for this belief is that we have hot springs, earthquakes, volcanos and other eruptions (Fig. 1).



## 3. HOW FAST DOES THE EARTH GO AROUND THE SUN?

It takes a little more than 365 days for the earth to complete its trip around the sun (Fig. 2). This space of time is called a year. The earth travels at an average rate of 18.5 miles per second.



## 4. WHAT IS THE EARTH'S EQUATOR?

The equator is an imaginary line around the middle of the earth dividing it into two parts; the northern and the southern hemispheres.

## 5. HOW DO WE KNOW THE EARTH IS ROUND?

Several proofs bear out the fact that the earth is round. Firstly, we can sail and fly around the earth (Fig. 3). Secondly, a ship at sea in a distance indicates a nearer curved or rounded appearance. And thirdly, when the sea-horizon is viewed from above, it appears equally rounded in all directions.





## ALL ABOUT THE CLOUDS

### 1. WHAT ARE CLOUDS?

Clouds are formed at different levels high above the ground when water condenses. The underside of these condensed banks of mist are called clouds.

### 2. DO CLOUDS HAVE ANY WEIGHT?

Even though clouds look light and airy, a good sized cloud can weigh many tons for they consist of condensed water.

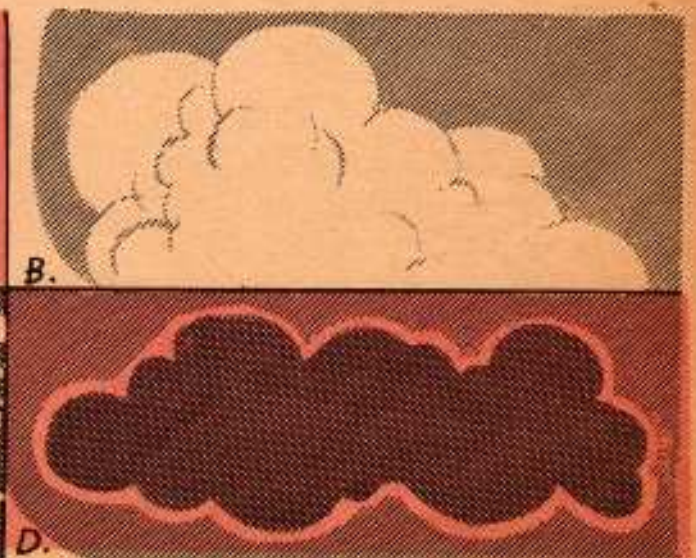
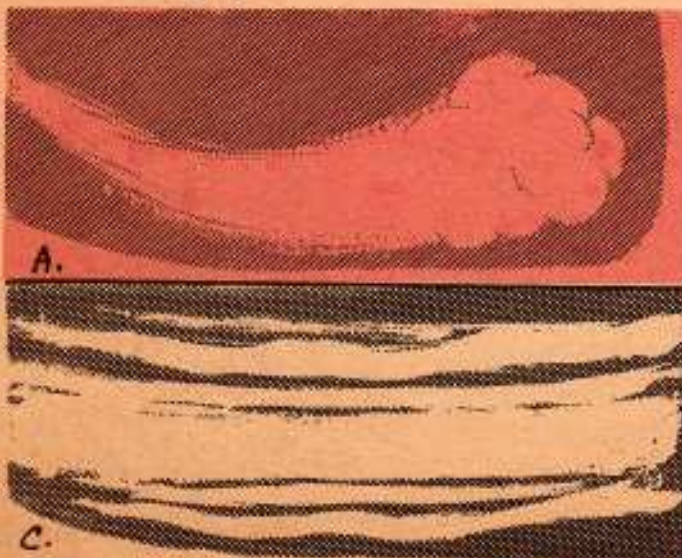
### 3. DO CLOUDS REMAIN THE SAME?

Clouds are continually changing as far as their form and appearance are concerned.

### 4. HOW ARE CLOUDS CLASSIFIED?

Clouds are classified into four distinct groups.

- The CIRRUS cloud — is a light, fleecy cloud that greatly resembles a feather or a lock of hair.
- The CUMULUS cloud — is a cloud that usually appears in summer. It is usually round and massive, sometimes covering the entire sky.
- The STRATUS cloud — this usually hangs low over the earth and is seen on summer evenings. It is a misty cloud and runs horizontally.
- The NIMBUS cloud — this is the rain cloud and has a uniform gray tint.





## ALL ABOUT THE WATERS THAT COVER THE EARTH

### 1. HOW ARE THE WATERS OF THE EARTH DIVIDED?

The waters of the earth are divided into four groups: springs, rivers, lakes, and oceans.

### 2. HOW MUCH OF THE EARTH'S SURFACE IS COVERED BY WATER?

Three-fourths of the earth's surface is covered by water. Scientists have estimated the amount of water in the sea at 323,722,000 cubic miles.

### 3. HOW DEEP IS THE SEA?

In different parts of the world the depth of the seas vary. In the North Pacific, near the island of Guam, the sea soundings in 1912 were a little less than 66 miles deep.

### 4. HOW DEEP IS THE OCEAN?

The average depth of the ocean is from 15,000 to 18,000 feet.

### 5. HOW DID THE SALT GET IN THE SEA?

The salt deposits which are present in the sea were carried in by rivers in ages gone by.

### 6. WHAT IS THE LARGEST FRESH-WATER LAKE IN THE WORLD?

The Great Lakes of North America contain more than half the fresh water on the surface of the earth. Lake Superior is the largest lake in the world. It is 32,000 square miles in extent, and is over 1,000 feet deep.





## ALL ABOUT NATURE'S MIRACLES

### 1. WHAT IS AN EARTHQUAKE?

An earthquake is a movement or break in the earth's crust. It may be only a slight tremor or shaking of ground, or a violent convulsion.

### 2. WHAT IS A VOLCANO?

A volcano is another type of disturbance of the earth's crust caused by the intensely heated condition of the earth's interior. In 79 B.C., one of the greatest volcanic eruptions occurred when Vesuvius exploded and fell on two Roman cities, Pompeii and Herculaneum. The volcano was accompanied by an earthquake at which time about 2,000 people perished.

### 3. WHAT IS A GEYSER?

Geysers are eruptive hot springs found chiefly in volcanic areas. These fountains of hot water rise to a height of 200 feet and occur at intervals varying from once every hour to once a day.

MT. VESUVIUS







1. WHAT IS LIGHTNING?

Lightning is the electrical discharge from the sky passing between two clouds, or between clouds and the earth.

2. WHAT IS THUNDER?

Thunder is the sound caused by the disturbance of the air when electricity passes between two clouds, or between clouds and the earth. It usually follows lightning.

3. CAN LIGHTNING KILL A PERSON?

The flash of lightning itself is harmless, but should the electricity pass through a person's body it might kill him.

4. WHAT IS THE DIFFERENCE BETWEEN SNOW AND HAIL?

Both snow and hail are condensed vapor. The difference between them lies in the way the tiny crystals are formed, and the way they cling to each other.

5. WHAT ARE SNOWFLAKES?

Snowflakes are caused by vapor condensing in air in a temperature below thirty-two degrees, Fahrenheit. Snowflakes occur in a great variety of forms usually hexagon or star shaped.





## ALL ABOUT TIME

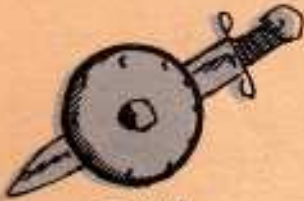
### 1. WHAT MAKES DAY AND NIGHT?



SUN



MOON



TIW



WODEN



THOR



FREYA



SATURN

As the earth spins on its axis, sometimes one side of it faces the sun, and sometimes it faces away from the sun. When a portion of the earth faces the sun, it is day. When it faces away from the sun, it is night. It takes one whole day and one whole night for a complete revolution.

### 2. WHAT IS DAYLIGHT SAVING TIME?

This means adjusting our clocks in such a manner, either forward or backward, to save daylight. The plan was adopted in 1916. Now each spring we move our clocks ahead one hour, and in the fall move them back again.

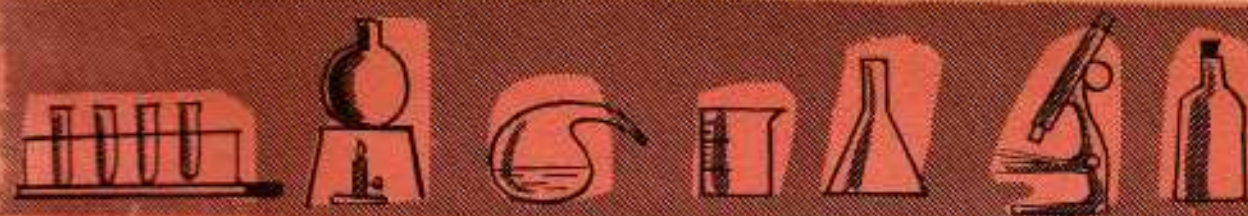
### 3. WHAT IS SHIP'S TIME?

On shipboard the twenty-four hours of the day are divided into six 4-hour watches. A bell strikes every half hour. It strikes 8 times at 12 noon; one time at 12:30; twice at 1 o'clock and so on.

### 4. HOW WERE THE DAYS NAMED?

The early people named the days, as well as the planets after their deities or gods. Sunday was named for the sun; Monday for the moon; Tuesday for the war-god, Tiw; Wednesday for the god, Woden; Thursday for the god, Thor; Friday for the goddess, Freya; and Saturday for the planet, Saturn.





## AMAZING FACTS ABOUT HEAVEN AND EARTH

### DO YOU KNOW . . .

1. THE EARTH AND THE MOON ATTRACT EACH OTHER with a force of 20,000 billion tons.
2. THE HEAT EMITTED BY THE SUN in one year weighs 120 billion tons.
3. IT WOULD TAKE 600,000 FULL MOONS to produce a night as brilliant as a day of cloudless sunshine.
4. HELIUM WAS FIRST FOUND ON THE SUN long before it was found in the sun's rays. A thimblefull of Helium has about 30,000,000,000,000,000,000 atoms.
5. THE ENERGY STORED IN A DROP OF WATER is equivalent to a year's continuous supply of 200 horsepower.
6. HYDROGEN IS THE LIGHTEST SUBSTANCE KNOWN. Its specific gravity compared to air is 0.0695.
7. AN AVALANCHE OR SNOW SLIDE WEIGHING MILLIONS OF TONS can be started down a mountain by a single yell or shout.
8. THE COLDEST SPOT IN THE WORLD is in Taiga country in Siberia. The temperature is 90 degrees below zero, Fahrenheit.
9. IF YOU LIVED ON THE MOON your weight would be one-sixth of what it is on earth.
10. THE WINDIEST SPOT ON EARTH is in Adelie Land where the average wind velocity is 50 miles per hour.



## DO YOU KNOW . . .

1. THE HIGHEST TIDES IN THE WORLD are in the Bay of Fundy which separates New Brunswick from Nova Scotia. The tides are often 60 feet high.
2. ICEBERGS ARE NINE-TENTHS below water, and it takes ages and ages to form one.
3. THE HIGHEST WATERFALL IN THE WORLD is Angel Falls in Venezuela. These falls are a thousand feet higher than any other falls.
4. THE VINEGAR RIVER in Colombia is so sour no fish can live in it.
5. LIFE EXISTS IN DEATH VALLEY, California, where it has always been thought to be too hot for any living thing. There are 150 forms of animal life and over 500 species of plants.
6. THE SUN SHINES FOR SIX MONTHS at a time at the North Pole. The other six months it is completely dark.
7. YOU CANNOT DROWN in the Dead Sea. There is 25% of salt in the sea which makes it so heavy that people can float on its surface.
8. SNOWFLAKES ARE ALL DIFFERENT, there are no two shapes alike.
9. LIGHTNING CAN STRIKE THE SAME PLACE. Scientists have found that lightning once struck ten times in the same place.
10. THERE ARE AT LEAST 100 LIGHTNING FLASHES every second, year in and year out, summer and winter. There are about 16,000,000 thunder storms annually, or about 44,000 per day.





## ALL ABOUT THE PLANT KINGDOM

### WHAT IS THE DIFFERENCE BETWEEN PLANTS AND ANIMALS?

All life is represented in two great kingdoms or groups, the plant kingdom and the animal kingdom. These two groups are divided into many smaller groups. The combined groups of the plant and the animal kingdoms make up nature's wonderful family.

Though the two groups look entirely different, in many respects they are alike. Both plants and animals grow from living cells, and develop into individuals having definite forms and organs. The cells that make up these living individuals are so tiny that they can only be seen through the powerful lens of a microscope. Some living things consist of only one cell, like the protozoa, which is the lowest order of life. Some consist of hundreds of thousands of cells, like man, which is the highest or most complex order of life. Yet these simple one-celled forms of life were the original ancestors of all later forms of life.

Both plants and animals exist for only a limited time, then they die off, and their species are carried on by their seeds or offsprings. This wonderful process of nature is called reproduction. Each group has its own specified function or work. But both groups are necessary for life to continue. It is in the functions of the two groups that we find the difference between the plant and the animal kingdoms.

Plants are rooted to the soil and cannot get about; animals are free to wander where they will, over earth, water and air. Plants get their nutrition from inorganic matter found in earth and air; animals get their nutrition mainly from other living things. Plants are able to transform inorganic matter into organic matter and thus provide food for the animal group.

For this reason scientists agree that of the two groups, the plant group is the most important. For all life, directly or indirectly, depends upon plants. And the distribution of vegetation or plants regulates animal life.



## ALL ABOUT TREES

### 1. WHAT KINDS OF TREES ARE THERE?

The trees of the forests are divided into three groups.

- a. Trees bearing foliage. These trees have foliage-type leaves which they lose in the Fall.
- b. Trees with acidulous leaves. These trees have stiff, needle-type leaves, which they retain all year round.
- c. Fruit-bearing trees. These trees bear fruit and are cultivated for the sake of their fruit.

### 2. WHY DO TREES HAVE BARK?

The bark of a tree serves two purposes. One is to protect the tree from outside injuries, and the second is to protect the inner part of the tree while the growing processes go on.

### 3. WHAT MAKES THE KNOT IN A TREE?

The knot of a tree is present at points where additional strength is needed. Those points are where smaller branches come off a larger stem.

### 4. HOW CAN WE TELL THE AGE OF A TREE?

As each tree grows older by the year, it also grows bigger by adding a layer of wood around its trunk. By counting these layers of wood when the tree is cut down, we can guess its approximate age.



### 5. WHY DO LEAVES CHANGE COLOR IN THE FALL?

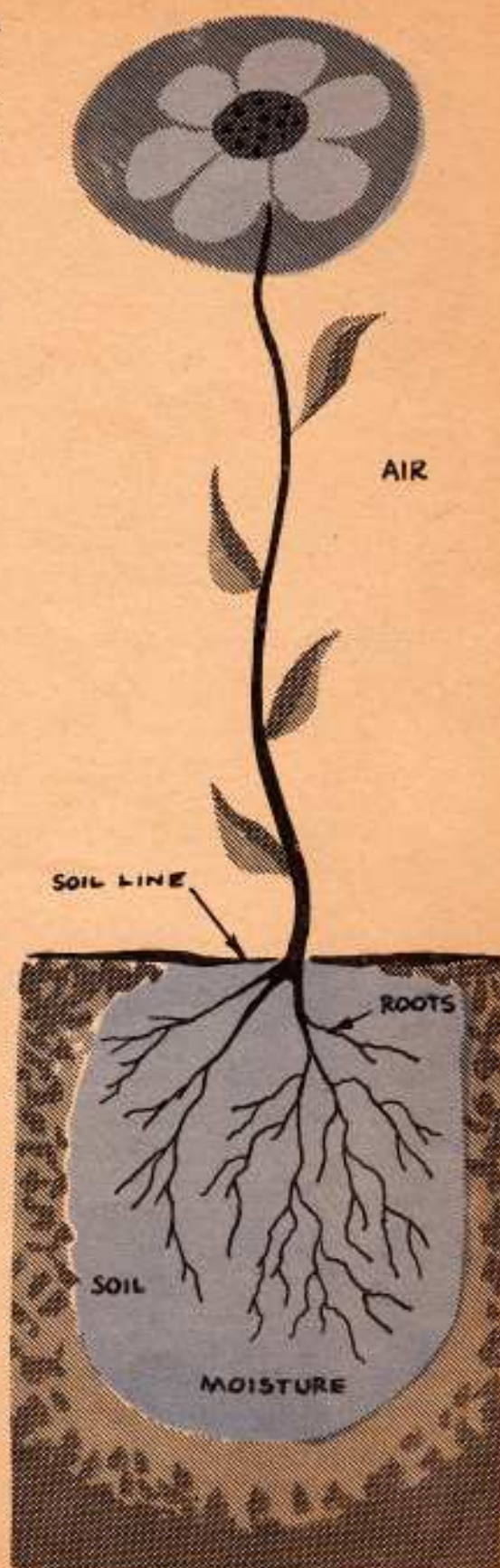
In the Fall while the tree is resting, its leaves lose their chlorophyll or green matter, for it has no use for it. The leaves fall to the ground and the bacteria of decay start to work on it and to convert it into food for the tree when it needs it in the spring.



SUN'S  
RAYS

## HOW DO PLANTS EAT, DRINK, BREATHE AND GROW?

1. Flower uses food supplied by plant to produce seeds.
2. Branches and leaves spread out to receive greatest amount of sun's rays.
3. Chlorophyll or green matter in leaves absorb energy from sun and water.
4. Carbon dioxide is absorbed from air and oxygen is thrown off.
5. Bark protects plant from outside injury, and inner part of plant while growing processes are going on.
6. Food manufactured in leaves and branches is carried down stem.
7. Fats and proteins are manufactured in various parts of plant and carried where needed.
8. Plants absorb moisture and drink through roots.
9. Roots hold plant securely, gather minerals from moisture, and store food.
10. Plant utilizes all elements from sun, air and soil, and grows.





# ALL ABOUT PLANTS



## 1. WHAT IS A PLANT CELL?

The cell is the structural and functional unit of a plant. It consists of a small, microscopic mass of protoplasm, a nucleus and a cell membrane. (Fig. 1.)

## 2. WHAT IS A PLANT BULB?

The bulb of a plant consists of a cluster of scale-like leaves that contain food for the plant when it starts to grow. Bulbs usually develop underground. (Fig. 2.)

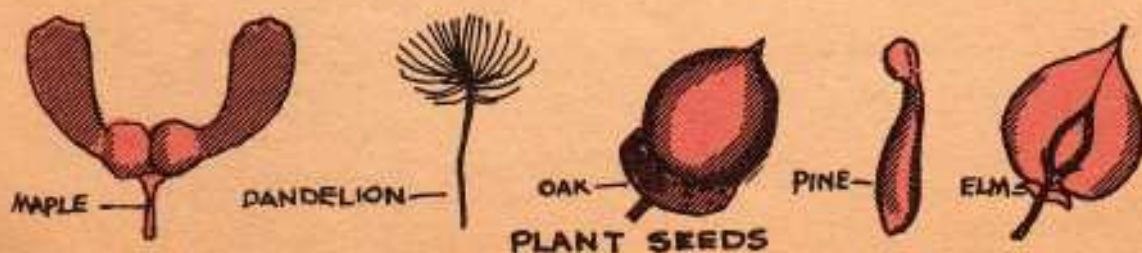


## 3. DO PLANTS SLEEP?

Plants do not sleep as we do. However, there is a period when the plant ceases to work. This period may be called the resting or sleeping period.

## 4. WHY DO WE HAVE POISONOUS PLANTS?

There are definite reasons why nature gave us poisonous plants. Firstly, a plant which is poisonous to us may be beneficial to other forms of life. And secondly, many poisonous plants supply us with valuable medical aids.





## ALL ABOUT FLOWERS

### 1. HOW DID THE DANDELION GET ITS NAME?

Many years ago people thought the petals of the dandelion reminded them of an even row of lion's teeth. So they called the flower dent-de-lyon, which in French means, teeth of the lion. From dent-de-lyon we got the word dandelion.



DANDELION

### 2. HOW DID THE DAISY GET ITS NAME?

Over a thousand years ago, the Anglo-saxons, who ruled England, thought the daisy reminded them of the bright yellow sun with its white rays of light. So they named the flower daiseyghe. This word is made up of two Anglo-saxon words meaning day's eye, which to them meant the sun. From day's eye we got the word daisy.



DAISY

### 3. HOW DID THE CRANBERRY GET ITS NAME?

Early people thought the cranberry plant looked like a crane. The stem looked like the long curved neck; the base of the flower looked like the head; and the pistil looked like the long sharp bill. So they called the plant crane-berry. Later the two words were contracted to cranberry.



CRANBERRY

### 4. HOW LONG ARE THE ROOTS OF A PUMPKIN PLANT?

If the entire root of a pumpkin plant consisting of its main root, its smaller roots, and its tiny rootlets were laid end to end, they would measure about 15 miles.



PUMPKIN



## ALL ABOUT UNUSUAL PLANTS

### 1. PLANTS THAT KILL ANIMALS

THE MARTYNIAS of South America, produce fruit that is covered with hooks that are 6 or 7 inches long. These hooks get deeply embedded in the flesh of animals causing misery and sometimes death.

THE AFRICAN GRAPPLE PLANT has a seed vessel lined with a number of curved hooks. These hooks become attached to the coats and hoofs of animals. In this way they are transported from place to place. Thousands of animals are crippled by these plants every year. This plant has been known to choke and thereby cause the death of lions.

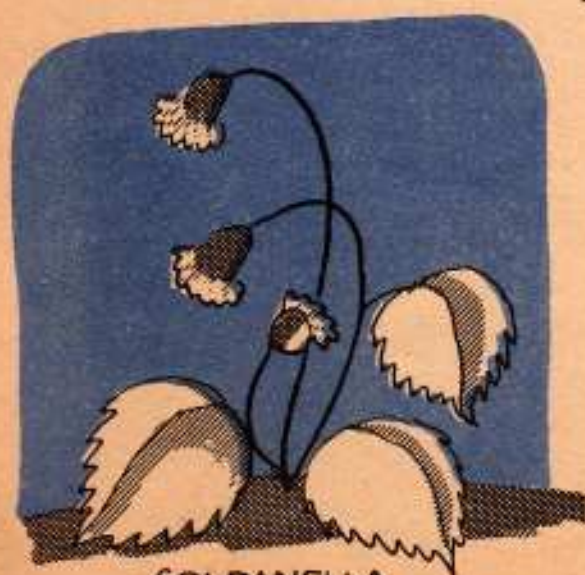
### 2. A PLANT THAT THRIVES IN THE SNOW

THE SOLDANELLAS is a tiny plant that grows on the lower slopes of the Alps. This plant releases so much heat, that it is able to melt a path or course through a thick coating of ice and snow, in its efforts to reach the light and air above.

### 3. A PLANT THAT LIVES ON OTHER PLANTS

THE MISTLETOE is a small shrub with long, leathery leaves and small white berries. This plant attaches itself to trees, and its roots

penetrate into the substance of the tree. It feeds on the tree on which it lives, eventually killing the tree.



SOLDANELLA

### 4. A PLANT WITH TWO KINDS OF LEAVES

THE CEPHALOTUS is a curious little Australian plant that bears two kinds of leaves. One set of leaves is quite ordinary, the other set is fly-catching like the pitcher plant.



## ALL ABOUT UNUSUAL PLANTS

### PLANTS THAT EAT INSECTS

1. THE PITCHER PLANT has a number of leaves lined with stiff hairs, that are shaped like little pitchers. These pitchers catch and hold rain water. When an insect crawls inside the pitcher looking for food, the little hairs all point down, like spikes in a fence, and the insect cannot crawl out. After a while the insect gets tired, falls into the water and drowns. Some of the materials in the insect's body go into the water in the pitcher and the plant absorbs it.
2. THE SUNDEW is a very tiny plant with flat leaves covered with tiny hairs. The leaves lay flat on the ground. At the end of each of the tiny hairs is a drop of sticky liquid that looks like dew. When an insect crawls on the leaf it gets caught in the dew on one of the hairs. The little hair then bends down toward the center of the leaf, and all the other little hairs do the same, holding the insect fast. The dew helps turn the soft part of the insect into a liquid which soaks into the leaf. Later the hairs open up, and the hard part of the insect blows away and the plant is ready to trap another insect.
3. THE VENUS FLYTRAP has leaves with stiff hairs that open and shut like a trap. When an insect touches one of the hairs, all the hairs of the leaf snap shut and hold the insect fast. The insect cannot crawl out because the hairs at the edges of the leaf fit so tightly that there isn't even the smallest opening. After the insect is digested by the plant the trap opens up again and the plant is ready for another victim.



PITCHER PLANT



SUNDEW



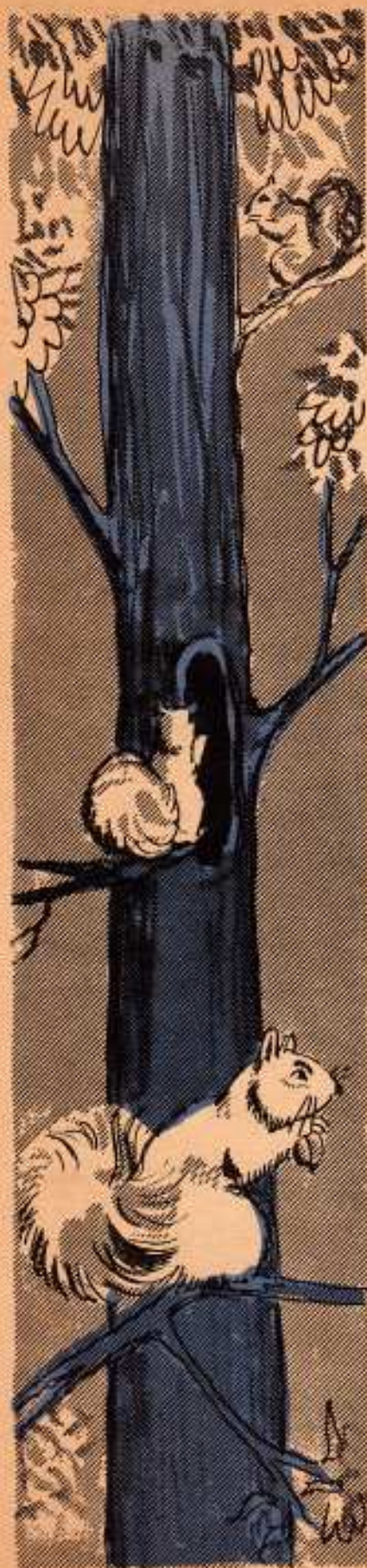
VENUS FLYTRAP



## AMAZING FACTS ABOUT PLANTS 'N FLOWERS

### DO YOU KNOW . . .

1. **THE WORLD'S TALLEST TREE** is a redwood which grows on the Redwood Highway in California. It is 364 feet high.
2. **A CHESTNUT TREE HAS A TRUNK** whose circumference measures more than 160 feet. Thirty men, holding hands, cannot encircle it. It grows on the slopes of Mount Etna in Sicily.
3. **THE DRAGON TREE** of Oratova in the Canary Islands, is from 8,000 to 10,000 years old.
4. **AN OAK TREE MATURES** in 120 to 200 years and often lives to a thousand.
5. **THE PETRIFIED FOREST** in Arizona is an entire forest of stone. Hundreds of years ago the living trees were buried under tons of rock. Centuries later when the rocks were removed, it was found that the trees had all turned to stone.
6. **LIGHTNING STRIKES OAK** and poplar trees more often than any other trees in the forest.
7. **FORESTS HAVE BEEN PLANTED BY GRAY SQUIRRELS.** Other squirrels collect their winter supply of nuts and hide them in a safe place until needed. The gray squirrel eats what he wants and buries the rest. More often than not, he never returns for them, and in the spring the nuts start to sprout into little seedlings.







### DO YOU KNOW . . .

1. THE SASSAFRAS TREE CONTAINS leaves of three different patterns. This tree is a common member of the laurel family.
2. A CENTURY PLANT BLOOMS as often as every 7 or 8 years.
3. COAL COMES FROM PLANTS that were buried under tons of rocks hundreds of millions of years ago.
4. THE WITCH-HAZEL PLANT SHOOTS its seeds into the air like bullets from a cannon. This plant blooms only in winter.
5. THE LEAVES OF A MAPLE TREE cover an acre if spread out side by side. An average tree has about 45,000 leaves.
6. THE LEAVES OF THE VICTORIA REGIA MEASURES 10 feet in diameter. This is a giant lily plant of the Amazons.
7. THE LARGEST SEEDS IN THE WORLD are those of the palm tree. The seeds often weigh more than 30 pounds.
8. THE SMALLEST SEEDS IN THE WORLD are those of the orchid. Seventy million seeds fit inside an average seed pod.





## DO YOU KNOW . . .

1. **THE LARGEST LIVING THING IN THE WORLD** is the wild box huckleberry plant of eastern Pennsylvania. A single plant rambles over from 2 to 3 acres of ground. It is also considered to be the oldest plant, as it is estimated to be 11,000 years old.
2. **THE LARGEST FLOWER IN THE WORLD** bloomed in the Botanical Gardens in New York City on June 8, 1937. It is a giant calla lily, 8½ feet tall, 4 feet in diameter and 12 feet in circumference.
3. **THE SMALLEST FLOWERING PLANTS** are called duckweed. These microscopic plants measure from one-thirtieth to one-fiftieth of an inch in diameter. These are the green coating plants that appear on fresh-water ponds.
4. **SEAWEED HAS STALKS** 500 feet long. This species of seaweed is found along the coast of Oregon and British Columbia.
5. **THE COMMON EUROPEAN PLANT** called Catmint, or Catnip, makes tigers, lions and other animals of the cat family, happy and playful. This is due to the stimulating effect the plant has on them.
6. **THERE ARE NO TRUE BLACK FLOWERS.** It is doubtful if any wild flower can ever produce any, for black represents a total absence of sunlight. And that condition does not exist among flowers in the natural state.



# ALL ABOUT THE ANIMAL KINGDOM

## HOW IS THE ANIMAL KINGDOM DIVIDED?

The animal kingdom is divided into many groups, ranging from the most complicated to the simplest. They are also classified into two great divisions. The METAZOA, whose bodies are composed of many cells, and the PROTOZOA, whose bodies consist of a single cell. We shall give a few examples of the animals in each group; however, there are many more.

### THE MAMMALS

This is the highest order of the animal kingdom and includes man. The members of this group have hard, bony skeletons and backbones. They have warm red blood and breathe through lungs. They bring forth living young which they nourish from their own bodies. They are usually covered with hair or fur.

1. THE MONKEY TRIBE — monkeys, gorillas, baboons, lemurs, and apes. The animals of this group are most like man. They are imitative, though not of high intelligence. They have four legs which closely resembles hands.
2. ANIMALS OF PREY — bears, lions, tigers, moles, raccoons, and minks. The most powerful and the most dangerous animals in the entire kingdom are in this group. They feed on the flesh of other animals.
3. THE RODENTS — rabbits, squirrels, mice, beavers, and lemmings. This group consists chiefly of gnawing animals. They are usually small, feed chiefly on plants, and sometimes sleep all winter long.



APE



BEAVER





RHINOCEROS



ARMADILLO



BAT

4. **HOOFED ANIMALS** — deer, giraffe, zebra, bison, gnu, and goats. This is the most important group of all, as domesticated animals used for food are included. They feed on vegetables for the most part.
5. **THICK-SKINNED ANIMALS**—elephants, rhinoceros, wild pig and tapirs. This group are usually huge in size, have very little or no hair, and feed chiefly on vegetables.
6. **TOOTHLESS ANIMALS** — armadillos, sloths and ant-eaters. This group have no teeth, are slow, stupid animals that work only at night. They live in trees or underground.
7. **POUCHED ANIMALS** — kangaroo, koala, and opossum. The animals of this group carry their young in bags or pouches. They are great jumpers and live chiefly on vegetables.
8. **BATS AND FLYING MAMMALS** — bats and flying lemurs. The animals of this group have true wings and can fly. They are half mouse and half bird. They feed upon insects.
9. **THE SEAL FAMILY** — seals, walrus, and sea lion. The animals in this group have webbed feet. They eat small marine animals and plants.
10. **WHALES** — dolphin, whales, porpoise and sea unicorn. The animals of this group have long fish-like bodies without any hair. Their limbs are in the form of fins. They feed chiefly on water animals and plants.



## THE BIRD FAMILY

The birds have bony skeletons and red warm blood. They breathe through lungs and lay eggs with hard shells. They have wings and are covered with feathers.

1. **BIRDS OF PREY** — eagles, falcons, hawks, vultures and owls. This group have curved, hooked beaks and powerful talons. They feed chiefly upon warm-blooded animals.
- ✓ 2. **CLIMBING BIRDS** — parrots, cuckoos and woodpeckers. They have long curved claws placed opposite each other in pairs. They feed upon insects and fruits.
3. **SINGING BIRDS** — canaries, sparrows, larks, robins and wrens. This group have an organ of song. They are small and beautifully colored. They feed on insects, worms and seeds.
4. **WADING BIRDS** — cranes, herons, ibis and plovers. This group have slender beaks and long stilt-like legs. They feed upon reptiles, insects and fish found in water.
5. **SWIMMING BIRDS** — albatross, pelicans, gulls and penguins. The front toes of the animals in this group are usually joined together by a membrane. They feed upon water insects, reptiles and fish.
6. **RUNNING BIRDS** — ostrich, emus, and rheas. This group have large bodies and powerful legs. They have wings but are unable to fly.
7. **GAME BIRDS** — chickens, partridges, pheasants and peacocks. This group are ground birds. They have strong clawed feet for scratching the ground for food.



BARN OWL



PELICAN



## THE REPTILE FAMILY

This group have backbones and rough, horny skin. They have red cold blood, and breathe through lungs. They lay eggs and many of this group have no feet.



TURTLE



LIZARD



SAILFISH

1. **TURTLES** — terrapin, land, mud, snapping and sea turtles. This group have a shelled back covered with bony plates. They are used by man for food.
2. **CROCODILES AND ALLIGATORS** — This group is lizard-like in appearance and have a tough scaly skin. They have four legs and a powerful tail.
3. **THE LIZARD FAMILY** — lizards, chameleons and iguana. They have sprawling limbs and a long tail. Some grow to a huge size.
4. **SNAKES AND SERPENTS** — boas, pythons, copperheads and rattlers. This group have no feet. They have elongated bodies and often poisonous fangs in the upper jaw. They produce their young from eggs which they lay, and feed upon living animals.

## THE AMPHIBIANS

The word amphibia means "double lived" which title is applied to this group, for they can live on both land and water. In this group are the frogs, newts, toads and salamanders.

## THE FISH FAMILY

This group is the last in the animal kingdom having a backbone. They have cold red blood and elongated bodies. They have fins instead of feet and live chiefly in water. In this group are the bony fishes, the cartilaginous fishes, the armored fish and the lung-fishes.



## THE MOLLUSCS

This group have no limbs. They manufacture a substance in their bodies from which they make their shells. This group includes snails, scallops, squids and cuttlefish.

## THE JOINED-LIMBED ANIMALS

This group have divided bodies, can live in salt and fresh water, and on both land and sea. In this group are the crabs, crayfish, lobsters, spiders, insects and grasshoppers.

## BUTTERFLIES AND MOTHS

This is the highest group in the insect family. They have four wings of great beauty.

## ANTS, BEES AND WASPS

This group is the most intelligent of the entire insect family. They are social insects that can live in harmony in large communities. Some species have transparent wings, others have a boring or piercing apparatus and still others have a poisoned sting which they use for defense.

## STARFISH AND SEA-URCHINS

This group have bodies that are symmetrical in shape and resembles stars or true flowers. Included are the sea-cucumbers, sea-lilies, starfishes and sea-urchins.

## THE WORMS

This group is very low in the animal scale of life. It includes earthworms, leeches, sea-anemones, coral, sponges and jelly-fishes.

## THE PROTOZOA

The animals in this group are the simplest form of animal life. Their bodies consist of one cell, a nucleus and a cell membrane. They reproduce by merely dividing in half, each half becoming a separate living animal.



WASP



STARFISH



ONE CELLED ANIMAL  
DIVIDING



## ALL ABOUT ANIMALS

### 1. HOW DO GORILLAS MAKE SOUNDS LIKE DRUM-BEATS?

When a gorilla is angry, frightened or excited, he beats his chestbone with his cupped hands. This makes a noise like the beating of a drum.

### 2. WHAT ANIMAL LIVES THE LONGEST?

It is believed that the giant tortoise of the Galapagos is the longest-lived animal in the world. It lives over two hundred years and weighs more than 600 pounds.

### 3. WHAT ANIMAL LOOKS LIKE A PLANT?

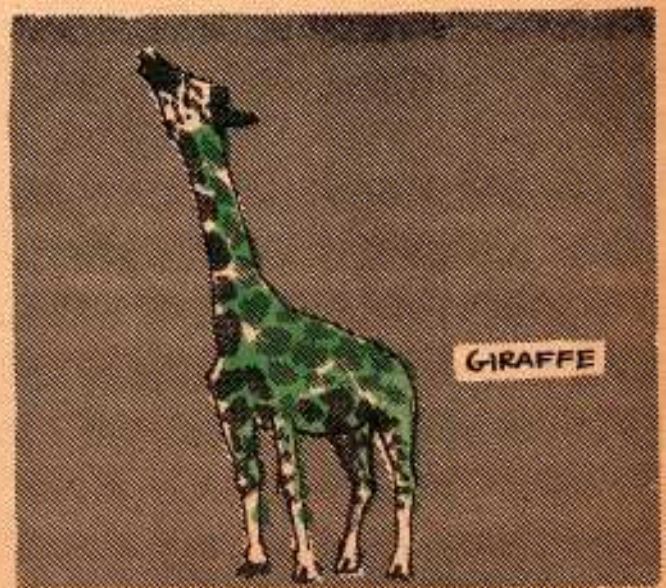
Sea-urchins have the same characteristics of plants and look more like plants than animals. Some species have as many as 3,000 spines which they use either to get around from place to place or to anchor themselves to the ocean floor.

### 4. WHAT ANIMAL DOESN'T HAVE A VOICE?

The giraffe is the one animal that cannot make a sound. Aside from this distinction, it is one of the strangest looking animals in the world. It is 3 times the size of a man; has a head and body like a horse; neck and shoulders like a camel; ears like a cow; a tail like a lion; legs like a deer and has the markings of a leopard.



TORTOISE



GIRAFFE



1. WHY DO SOME ANIMALS SLEEP ALL WINTER?

Some animals do not like cold weather but are unable to go to warm climates like birds. When cold weather arrives these animals are able to go into a long winter's sleep. This is called hibernation. As they do not need food while they are asleep they can pass the winter hibernating.

2. WHAT IS THE LARGEST LIVING ANIMAL?

✓ The great blue or sulphur-bottom whale found in the Arctic regions, is the largest living animal. These animals often weigh as much as 8 large-sized elephants.

3. WHY DOES A LION ROAR?

✓ When a lion is prowling around for food in the jungle, he lets out a terrific roar to startle the animals in hiding so that they will jump and he can locate them. They also roar when they are angry or in fights.

4. DO POLAR BEARS SUFFER FROM HEAT?

At first polar bears do not like the heat but they soon become accustomed to it and don't mind it at all.

5. WHAT IS THE FASTEST FOUR-LEGGED ANIMAL?

The cheetah, found in Africa and southern Asia, for short distances, is considered the fastest animal in the world. It can run more than 70 miles an hour.



A LION





1. HOW MANY KNOWN ANIMALS ARE THERE?

To date, zoologists have named and classified more than 600,000 species of animals.

2. CAN ANY ANIMALS EAT POISONOUS SNAKES AND NOT DIE?

Hogs frequently kill and eat poisonous snakes without being poisoned by them.

3. WHAT IS THE BUSIEST ANIMAL?

The beaver is considered the busiest of all animals. He is constantly in action, building, storing food and, sometimes, playing.

4. CAN ANIMALS TALK TO EACH OTHER?

There must be some sort of communication between animals or else they could not live together in societies as they do. Insects with long "feelers" talk together by touching feelers.

5. CAN ANIMALS THINK?

Animals can't reason but they can think and remember.

6. DO ANIMALS SUFFER PAIN?

Animals do suffer when they are injured but not to the extent of a human being.

7. HOW LONG DO ANIMALS LIVE?

The life span of animals vary, from the giant tortoise that lives more than two hundred years to the little May fly, an insect that only lives a couple of hours.





## ALL ABOUT BIRDS

### 1. HOW DO BIRDS KNOW HOW TO BUILD THEIR NESTS?

Birds have a power which we call instinct, such as many other animals have, that give them the know-how to do many wonderful things.

### 2. DO ANY BIRDS HAVE TEETH?

No existing species of birds has teeth. However, many pre-historic feathered creatures did have teeth. A bird does not chew his food when he swallows it, it is ground by gravel in the gizzard.

### 3. CAN ANY BIRDS FLY UNDER WATER?

A family of birds known as Ouzels or dippers, can swim under water. They use their wings under water as if they were flying in air.

### 4. ARE BLACKBIRDS EVER WHITE?

Blackbird is the name given to a species of bird, therefore there can be white blackbirds, too.

### 5. ARE THERE ANY BIRDS TRAINED AS FISHERMEN?

A species of birds known as Cormorants, are trained by their masters to get fish from the sea and to return to the boat with them. These birds wear a long leather collar to keep them from eating the fish they catch.

### 6. CAN ANY BIRD FLY BACKWARDS?

The humming bird can not alone fly backwards, but can also remain stationary midair.

### 7. WHAT BIRDS ARE KNOWN AS THIEVES?

The crow family have organized bands of thieves with leaders, lieutenants and sentinels.



## ALL ABOUT SNAKES



1. DO SNAKES TRAVEL IN PAIRS?

There is no truth in the story that snakes travel in pairs, nor that if one is killed the other will avenge its mate's death.

2. DO ANY SNAKES CLIMB TREES?

The American black and blue racers (called such because of their color and swiftness) twist themselves about the smaller branches of trees to climb, and they also jump from a branch of one tree to another.

3. ARE THERE ANY FLYING SNAKES?

There is a species of snake known as the *Chrysopela Ornata* that is found in Burma, India, and Asia that can glide through the air from a higher elevation to a lower one.

4. WHY DO SNAKES DART OUT THEIR TONGUES?

As snakes do not have ears scientists believe that when a snake darts out its tongue it is listening.

5. WHAT MAKES THE POISON IN A SNAKE'S FANGS?

The snake's fangs are his eye-teeth. These teeth have hollow channels through which the poison flows when the snake bites. The poison itself is produced in the glands of the snake.

6. HOW DO SNAKES GLIDE?

In the snake's body are three parts which take part in the movement of the snake: its backbone; its ribs, and its underside scales. The contraction of the muscles of these three parts cause the gliding movement of the snake.

7. IS THERE ANY PLACE WHERE THERE ARE NO SNAKES?

There are no native snakes in Ireland, Hawaii, Iceland, Crete, Malta, New Zealand and many other islands.



## MORE ABOUT ANIMALS

### 1. WHAT IS THE DIFFERENCE BETWEEN A FROG AND A TOAD?

Though frogs and toads greatly resemble each other there are a number of outstanding differences. Toads have shorter hind legs than frogs, a rougher skin, a heavier breastbone, and a total lack of teeth.

### 2. DO ANY FROGS LIVE IN TREES?

There is a species of frog that makes the tree its home. The toes of this species are equipped with tiny sucker pads that make it possible for the frog to grip the tree. This species also has the power of changing its color to match its surroundings just like the chameleon.

### 3. WHAT IS THE LIFE HISTORY OF A FROG?

The frog starts its life as an egg, found in a mass or string, in ponds, ditches and lakes. It then becomes a tadpole. The next step is the polliwog stage. Then it changes its funny tail for legs, and its gills for lungs, and becomes a frog. As a frog it can live on land yet returns to the water to lay its eggs. A frog cannot stay under water for any length of time or it will drown.

### 4. WHAT IS THE DIFFERENCE BETWEEN A NEWT AND A SALAMANDER?

Newts and salamanders both resemble lizards. Newts live in ponds, ditches and any kind of still water. Salamanders are nocturnal animals that live under decayed leaves and vegetation in woods and hedges.

#### LIFE OF A FROG





## ALL ABOUT FISH



### 1. HOW CAN FISH LIVE ON THE OCEAN FLOOR?

Fish can live on the ocean floor, for nature has equipped them to withstand the great undersea pressure.

### 2. CAN FISH SEE, HEAR AND FEEL?

Fish can see, hear and feel. Though they have no visible ear, they have an internal ear which conducts sound to the brain. They can feel pain though not as sharply as we do.

### 3. HOW FAST CAN A FISH SWIM?

A fish can swim as fast as 10 yards a second for short distances.

### 4. CAN ANY FISH SHED ITS SKIN?

A species of fish called *Agriopus* or "horsefish" sheds its skin like a snake.

### 5. CAN FISH LIVE ON LAND?

Fish cannot live on land, for they have no lungs. Fish must have air which is dissolved in water, their gills make it possible for them to get the air they need from water.

### 6. WHAT IS THE QUEEREST FISH?

The seahorse is the queerest fish in the sea. It has the arching neck and head of a stallion; the swelling bosom of the pouter pigeon; the tail of the monkey; the shell of the beetle; and the changing color power of the chameleon. This fantastic creature also has a kangaroo-type pouch in which the male carries the young.



## ALL ABOUT UNUSUAL FISH

1. THE STARFISH looks like a five-point star. It doesn't have a head, yet at the end of each of its five points, it has an eye sharp enough to see far beyond the human eye. If it loses one of its points, it quickly grows another to take its place.
2. THE PIPEFISH looks like a floating blade of eel grass. It is about 4 inches long and less than one-eighth of an inch wide.
3. THE PIRANHA is a man-eating fish though only 4 inches in length. Their teeth are as sharp as razor blades.
4. THE ZEBRA FISH has a hypnotic power that paralyzes its prey.
5. THE BLACK ANGEL FISH has a set of false teeth in a jaw set on hinges. The fish can drop its entire mouth and then slip it back into place.
6. THE AFRICAN LUNG FISH can live out of water for 6 months at a time. On land it inhales air like any land animal.
7. THE SEA ROBIN has "wings" and legs. When swimming undersea, it spreads its wings and looks like a flying bird.
8. THE CRUCIFIX FISH was so named, for its skull and backbone resemble the conventional pictures of Christ nailed to the cross.
9. THE PUFFER-FISH inhales water and air and makes itself 3 times its normal size.
10. THE CANDLE FISH is so fat and oily, that it can be used as a lamp, by merely drying it out and drawing wick through it.







1. WHAT IS AN OCTOPUS?

The octopus is a deep sea fish, more commonly known as the devil fish. It has a rounded body, a small head, and 8 long arms equipped with suckers. Different species vary from the size of a postage stamp, to monsters measuring over 14 feet. It is used by the Chinese as food.

2. WHAT IS CUTTLEFISH?

This is also a deep sea fish that has 10 arms surrounding its mouth. It has an ink bag which contains an inky fluid called "sepia" which is used in making printers' ink and water colors. The cuttlebone from the cuttlefish is used as a lime supply for caged birds. It is used as food.

3. WHAT IS A SQUID?

This is a large family related to the octopus and cuttlefish group. The giant squid is the largest creature in the world without a backbone. It has a barrel-shaped body, a head, and 10 tapering tentacles or legs, equipped with numerous suckers. It has an ink sac and when attacked by an enemy it squirts the contents of its sack into the water. Giant squids sometimes measure 52 feet including their legs.

4. WHAT IS AN OYSTER?

This is probably the most valuable of all the mollusks. Not only is it used for food, but the interior of their shells are lined with mother-of-pearl which is used for buttons, knife handles and many other commercial objects.

5. HOW DOES AN OYSTER MAKE A PEARL?

When a foreign substance comes between the oyster's body and its shell, the same substance with which it lines its shell, covers the foreign particle and forms a valuable pearl.





FIREFLY



DRAGONFLY

## ALL ABOUT JOINT-LIMBED ANIMALS

### 1. HOW MANY INSECTS ARE THERE IN THE WORLD?

More than 600,000 different species of insects have been named and classified to date. There are new species being discovered daily.

### 2. DO DRAGONFLIES STING?

Dragonflies do not have stingers and cannot sting.

### 3. WHAT MAKES A GLOW WORM GLOW?

The glow worm, which is not really a worm at all but the female of a species of beetle, gives off a "cold light" due to luminous phosphorescence organs placed over its tail end. The light given off is yellowish-green.

### 4. HOW MUCH LIGHT DOES A FIREFLY GIVE OFF?

The "cold light" given off by the firefly is 10 times as efficient as an electric light.

### 5. WHAT ARE INSECTS' ANTENNAE USED FOR?

The antennae or "feelers" of the insect, are the means by which the insect feels, touches, and very often hears.

### 6. HOW STRONG ARE INSECTS' EYES?

This varies in the different species of insects. However, there are certain species of insects whose eyes consist of more than 20,000 lenses or facets.

### 7. HOW DO INSECTS "SING"?

All insects cannot "sing." Those that do have singing organs have small shell-like growths that resemble the rough edges of a saw. Only males have these organs of sound and use them during the mating season.



## ALL ABOUT UNUSUAL INSECTS

### 1. WHAT IS THE PRAYING MANTIS?

The praying mantis is a large, queer-looking insect with big round eyes, a wagging head and a strong pair of wings. The insect carries its forelimbs in a position as if in prayer, which is the reason for its name.



### 2. WHAT IS THE SEVENTEEN-YEAR LOCUST?

The real name of this insect is the Seventeen-Year cicada, for it is not a true locust. The unusual life-story of this insect sets it apart for all others. The first stages of its life is spent underground. At this time it is wingless, and looks like a small, fat crab. It lives underground for seventeen years, getting its nourishment by sucking the juices from the roots of trees. As it grows it keeps shedding its skin for larger ones. At the end of seventeen years, it leaves the ground, and its new glossy wings unfold, as it flies into the air and sunshine.



### 3. WHAT IS A WALKING STICK?

The walking stick is another insect oddity, no longer than a man's little finger. It's brown or green in color, wingless, and has long, thin, stem-like limbs. It looks exactly like a slender twig. When the walking stick is frightened, it remains completely motionless and in this way escapes detection.





## ALL ABOUT SPIDERS

### 1. WHAT IS THE DIFFERENCE BETWEEN A SCORPION AND A SPIDER?

Scorpions and spiders are related, as both are members of the arachnids. Both have a manner of manufacturing poison in their bodies, but only the scorpion is able to sting.



SCORPION

### 2. IS THE BITE OF A SPIDER POISONOUS?

A person bitten by a spider will become ill for some length of time, but only the bite of the deadly Tarantula will sometimes cause death.

### 3. WHAT IS A CENTIPEDE?

This creature is another member of the spider family. It's a cruel, poisonous little creature that has many pairs of legs, varying from ten to more than a hundred. It lives in dark, damp places and feeds upon the flesh of animals.



CENTIPEDE

### 4. HOW DOES A SPIDER SPIN A WEB?

The spider manufactures the silk for its web from its own body. The manufactured silk leaves the spider's body through little tiny hollow tubes, many strands at a time. These many strands, sometimes more than a hundred, form into a rope as thick as a single strand of hair. The end of the rope is fastened by means of a sticky substance, to some projection or object. Then the spider runs up and down, and from side to side, spinning its web. When the web is finished, the spider covers the entire web with a glue-like substance, also manufactured within its body, which will hold fast any object that comes in contact with it.





## ALL ABOUT BUTTERFLIES AND MOTHS

### 1. WHAT IS THE DIFFERENCE BETWEEN BUTTERFLIES AND MOTHS?

Butterflies and moths both belong to the same "scaly winged" insect group, as both have wings covered with tiny color scales. However, there are several ways by which they can be told apart. The antennae or "feelers" of the butterfly have knobbed tips, whereas, the moth's antennae are feathery and hair-like. Then again, butterflies fly by day, and moths, by night. One last difference is that when butterflies are resting, they hold their wings straight up from their bodies, while moths hold theirs out flat.

### 2. WHAT IS THE LIFE-STORY OF A BUTTERFLY?

We'll take the life-story of the monarch butterfly and its host, the milkweed plant for our example, as each species of butterfly has its own leaf preference.

The monarch butterfly lays its eggs, singly or in masses, on its host, the milkweed plant. The tiny eggs are beautifully shaped, and look like little gems. After a time the caterpillar emerges from the egg, eats up the empty egg-shell, and starts feeding on the milkweed leaves. It does nothing but eat and grow. Each time its skin gets too tight, it sheds it and gets a new, larger one. This process is called molting and happens over and over again. When the caterpillar is full grown, it molts for the last time. This time it makes itself a new soft-looking skin that looks like a little green and gold bag. Soon after the little bag hardens and the caterpillar seems to go to sleep. This is called the chrysalis stage. However, during this period changes are going on both inside and outside the chrysalis. At last the chrysalis splits open and out comes a full-grown butterfly.





## ALL ABOUT ANTS

The most interesting and by far the most intelligent of all the tiny insects, are the ants, and their manner of living. Ants start life as helpless, limbless larvæ or eggs, that have to be fed and cared for by female workers, known as ant nurses. The manner by which the nurses feed the baby ants is most unusual. Each nurse has a special little bag or pouch, attached to her own gullet which is a storeroom for the food she squeezes into the baby ant's mouth. When the ants are grown, they take their places in the community where each has his own special work.

An ant community is probably the most remarkable accomplishment of the ants. The community is like a busy little city where thousands of ants live together in perfect harmony. It has streets, highways and roads, lined with nurseries for baby ants; storage houses for food; barracks for soldiers; quarters for workers, and stables for aphids or "ant cows."







A WORKING ANT

The working ants dig tunnels and roadways, while the carpenter ants build rooms, houses and nests. The earth which is removed by the digging ants form the little ant hills that appear above the surface of the ground. Other ants roam the surrounding neighborhood in search of food, while still other ants gather the grain. The farmer ants plant mushrooms while other ants tend and milk the ant cows.

Inside the ant hill, there is just as much activity. Nurses take care of the baby ants; chambermaids keep the nests clean; garbage collectors gather the refuse; undertakers carry off the dead; soldiers defend the nest and capture the slaves.

Over the entire colony there is one ruler, the queen ant, mother of all the ants in the community. The queen ant spends her entire life laying eggs, which soon after hatch into thousands of baby ants and start the life cycle all over again.



## ALL ABOUT BEES

1. HOW MANY SPECIES OF BEES ARE THERE?  
To date there have been 10,000 species of bees known and classified.

2. HOW MANY BEES MAKE UP A COLONY?  
A bee colony consists of one queen bee, a few hundred males or drones, and 50,000 workers.

3. WHAT MAKES A BEE HUM?  
The bee's hum is caused by the movement of its wings as it flies through the air. The bee's wings move very rapidly, and this sets up waves in the air that causes a humming sound.



QUEEN BEE

4. DOES THE QUEEN BEE HAVE A STING?  
The queen bee has a sting but it differs from the sting of the working bee. The queen bee only uses her sting to kill rival queens.



BUMBLEBEE

5. WHY DO BEES SWARM?  
At a certain time of the year, the queen bee leaves the hive accompanied by the drones. It is called her "wedding flight" or honeymoon. About 48 hours later the queen returns to the hive and begins laying eggs.

6. HOW MANY EGGS DOES THE QUEEN BEE LAY?  
It has been estimated that the queen bee lays about 3,000 eggs in a single day.

7. HOW DO BEES GET NECTAR FROM THE FLOWERS?  
The mouth parts of bees are divided into 3 separate jaws. The first jaw is used in the making of the comb. The second and third jaws are used for drawing or sucking nectar and other sweet fluids from flowers.



HONEY COMB





HONEY BEE  
SIPPING NECTAR

1. HOW MUCH DOES A HONEY BEE WEIGH?

A honey bee weighs a little less than one three-hundredths of an ounce. That would be about 5,000 bees necessary to make up one pound.

2. HOW MANY BEES WOULD IT TAKE TO PRODUCE ONE POUND OF HONEY?

More than 1,000 bees must work an entire lifetime to produce one pound of honey.

3. HOW MUCH NECTAR IS REQUIRED FOR ONE POUND OF HONEY?

It takes 37,000 pounds of nectar for bees to convert into one pound of honey.

4. DO BEES MAKE HONEY OF DIFFERENT FLAVORS?

Honey does have different flavors, depending upon the flowers from which the nectar was taken. The most popular flavors are: heather, lavender, orange-flowers, white clover, rosemary, basswood and lime tree.

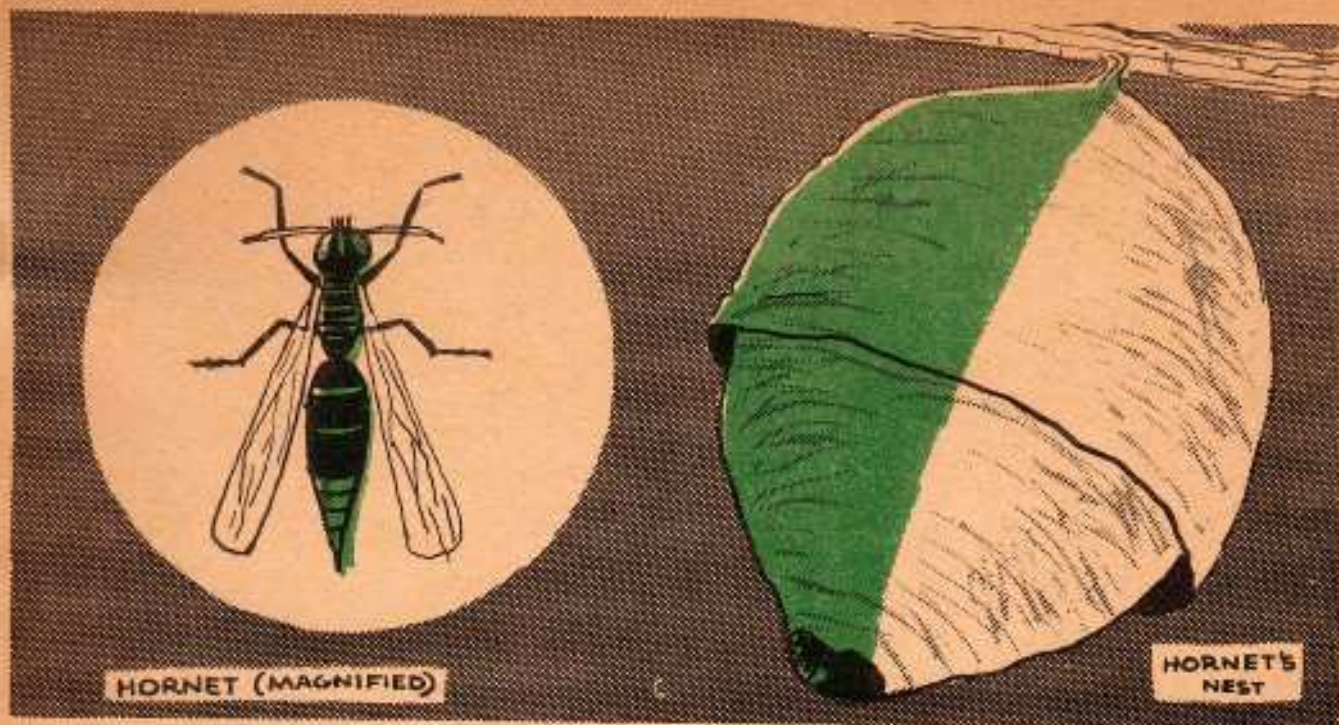
5. HOW DO BEES MAKE A HONEY COMB?

The worker bees place a frame in the hive which becomes the foundation of the comb. The bees then build the comb from wax manufactured in their own bodies. Then the spaces in the comb are filled with honey which they manufacture from the nectar taken from flowers, and then the entire comb is covered with wax.

6. WHAT IS THE HONEY COMB USED FOR?

The baby bees thrive and grow in the honey in the compartments of the comb. One bee is in each compartment.





## ALL ABOUT HORNETS

### 1. WHAT IS A HORNET?

A hornet is the largest and the nastiest member of the social wasp family. It has a powerful sting and kills off hundreds of harmful insects and bugs daily. It is especially fond of house flies. Its appetite is so great that its daily diet consists of many times its own weight in dead insects.

### 2. HOW DOES A HORNET MAKE ITS NEST?

Each spring the hornet queen selects a place to build her nest. She starts her nest by first spreading a thin coat of glue-like fluid over the surface. To this she attaches a small paper string, or cable, about the size of a toothpick. The material to build the nest, is made from a fuzzy down or lint the hornet gathers from dead wood, and chews and mixes with a secretion in her mouth. As the nest grows in size the hornet extends the string or cable. Inside the nest is a comb consisting of tiny cells in which the hornet queen lays her eggs. The nests are usually in the shape of a large ball, with an opening at the bottom for a door. They weigh anywhere from five to fifty pounds.



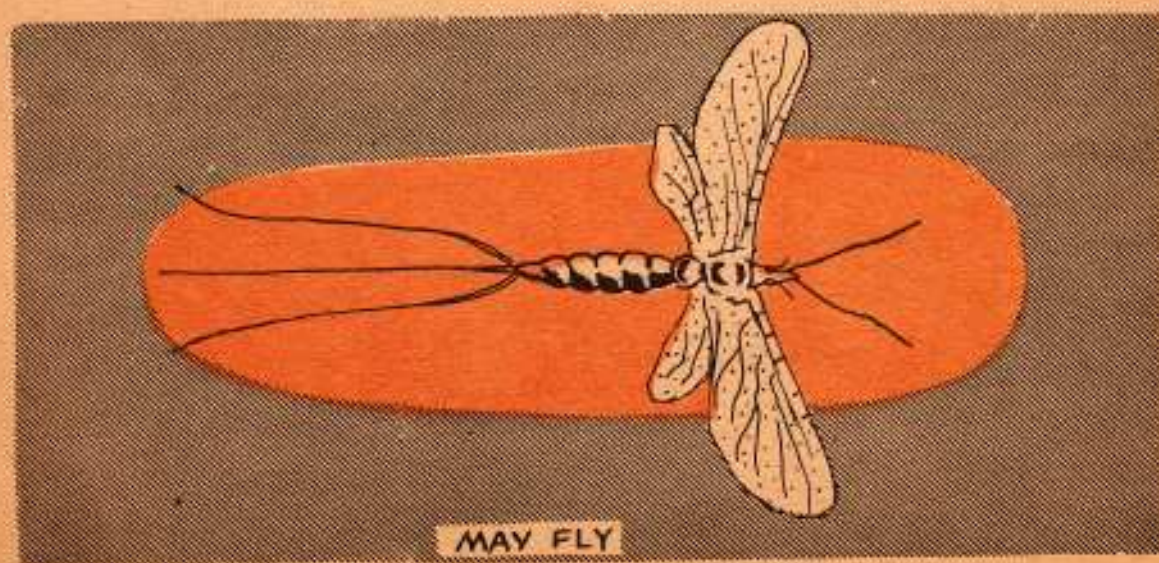
## ALL ABOUT THE MAY FLY

### 1. WHAT IS A MAY FLY?

The May fly is one of the strangest insects of the entire family, for its whole life span is only one day. It has no mouth and doesn't take a drop of food from the day it develops to the day it dies. It has legs and feet, but only uses them once in its lifetime and never again. It spends its entire life in the air, flying around until it becomes exhausted, and drops to the ground and dies.

### 2. WHAT IS THE LIFE-STORY OF THE MAY FLY?

The May fly starts life as a tiny, ugly grub-like creature in the muddy bottom of lakes and rivers. It has gills like a fish and breathes under water. At a certain time of the spring it crawls out of the mud to the surface of the water, its skin pops open and out comes the beautiful, fairy-like May fly. Now it breathes air through lungs, and would drown if returned to the water. It flies to a nearby twig where it sheds the rest of its skin and its wing covers. This is the only insect that has wing covers, and this is the only time it ever uses its legs. As soon as its skin is shed, the May fly takes to the air and finds its mate. On its one day of life, the May fly lays its eggs and then flies off until its strength is gone. Finally it drops to the ground and dies.





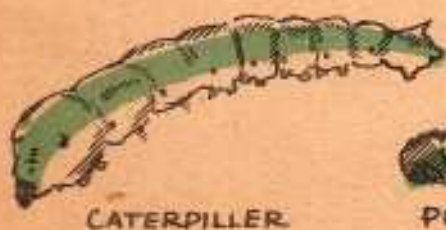
## ALL ABOUT SILKWORMS

### 1. WHAT IS A SILKWORM?

Silkworms are tiny insects that spin cocoons from which raw silk is made. This raw silk is later manufactured into silk cloth. China was the first country, five thousands years ago, to raise silkworms and manufacture silk cloth. Today many other countries raise silkworms.

### 2. WHAT IS THE LIFE-STORY OF A SILKWORM?

Silkworms are hatched from eggs that are about the size of a pinhead. When a silkworm is first hatched, it's about one-eighth of an inch long. It feeds on chopped mulberry leaves and grows rapidly. As the silkworm grows larger and larger, its skin splits open and it gets a new skin. When the silkworm is full grown it gets restless and stops eating. Now it is given bits of straw and other material and it starts to spin its cocoon. The cocoon is made from long, slender, silk threads which the silkworm manufactures in its own body. The silkworm fastens the end of the thread to a bit of straw, and winds the thread around its own body, making the walls of the cocoon. This takes about two or three days. Inside the cocoon, the silkworm shrinks to a thin little worm, covered by a hard brown shell. Now it goes to sleep. After several days, the brown shell opens, and out comes a moth. The moth breaks its way through the walls of the cocoon and flies into the air and sunlight. It flies away, finds a mate, and lays the eggs for the new baby silkworms.



LIFE STORY OF A SILKWORM



## AMAZING FACTS ABOUT THE ANIMAL KINGDOM



ELEPHANT



BLUE WHALE

### DO YOU KNOW . . .

1. THE BLACK BUFFALO OF SOUTH AFRICA is the most dangerous animal in the world. It will attack without reason.
2. THE GIANT TORTOISE OF THE GALAPAGOS lives longer than any other animal. Its life span is about 200 years.
3. THE CHEETAH IS THE FASTEST four-legged animal. It can run more than 70 miles an hour.
4. MONKEYS HAVE ORGANIZED BANDS of thieves with leaders, lieutenants, and sentinels.
5. WHITE HORSES ARE NOT BORN white, but grey or mottled.
6. AN ELEPHANT CAN PICK UP a tree or a needle with its trunk. It can also carry 1,200 pounds or pull 50 men.
7. WHALES, NATIVES OF THE ARCTIC, ARE THE LARGEST living animals. Some have mouths so large, a boat and its crew can float inside.
8. THE BLUE WHALE IS THE LARGEST animal that ever lived.
9. SEALS CAN STAY AFLOAT IN WATER 8 months at a time.



## DO YOU KNOW . . .

1. A WORM CUT IN TWO lives on indefinitely. This is because its nervous system is scattered all over its body, not centralized in one place.
2. THE SPHENODON, A LIZARD-REPTILE, when it loses its tail or legs immediately grows another. This tiny creature is the only living direct relative of the mighty dinosaur.
3. A PRAIRIE DOG IS NOT A DOG, it's a ground squirrel. It's called a dog on account of its bark.
4. THE COMMON TOAD SHEDS AND SWALLOWS its own skin several times a year.
5. A GAZELLE CAN JUMP 12 feet in height and 40 feet in length.
6. THE BAT HAS "FINGERS" as long as its body.
7. THE TWO-TOED SLOTH IS THE LAZIEST living thing.
8. THE JUMPING MOUSE CAN JUMP 40 times the length of its body.
9. SNAILS "WALK" on their one "foot" with the aid of a gummy fluid they secrete from their bodies.



DINOSAUR



SPHENODON



## DO YOU KNOW . . .



ALLIGATOR

LEOPARD



1. HORSES, MILLIONS OF YEARS AGO, were no larger than small dogs.
2. THE LARGEST RODENT IN THE WORLD is the Capybara. It looks like a giant guinea pig and weighs over 150 pounds.
3. A SINGLE PAIR OF RATS, breeding for 3 years, would have a family of over 500,000,000.
4. THE SMALLEST HOOFED ANIMAL IN THE WORLD, is the mouse deer, or Chevrotain of Africa. It is as large as a rabbit and weighs about 5 pounds.
5. ALLIGATOR BABIES WEIGH  $1\frac{3}{8}$  of an ounce when born. An adult alligator's jaw has the pressure equivalent to half a ton.
6. KANGAROOS CAN COVER 20 feet in a single jump. Kangaroo babies are only an inch long.
7. THE LEOPARD IS MORE DANGEROUS than the lion.
8. SHARKS REPLACE THEIR WORN OUT TEETH with a new set.



## DO YOU KNOW . . .

1. THE OSTRICH IS THE LARGEST living bird. It has from 2 to 7 wives.
2. THE OWL HAS NO RELATIVES outside of its own family. It is equipped with silencers on its wings.
3. THE TAILOR-BIRD, of East India, builds a cone-shaped nest by stitching together leaves of plants.
4. THE GREBES, or hell-divers, a family of duck-like birds, build floating nests.
5. A SPECIES OF PARROT called Kea, of New Zealand, attacks sheep and drains the fat from their kidneys.
6. LOONS CAN FLY under water. They use their wings as if they were flying in air.
7. THE RUFFED GROUSE GROWS a pair of "snow shoes" to aid him in walking on snow in winter.



RUFFED GROUSE



## DO YOU KNOW . . .



HUMMINGBIRD



WOODPECKER

1. THE SMALLEST BIRD IN THE WORLD is the fairy humming bird of Cuba. It is less than  $2\frac{1}{4}$  inches long and weighs  $\frac{1}{219}$ th of an ounce.
2. THE ARCTIC TERN, a member of the gull family, flies an average of more than 22,000 miles each year.
3. THE LARGEST WING-SPREAD of any bird is possessed by the Albatross. Its wing-spread is 12 feet from tip to tip.
4. THE FASTEST FLYING BIRD is the swift. It can fly 200 miles an hour.
5. THE HUMMING BIRD is the only bird that can fly backwards.
6. THE WOODPECKER'S HEAD is set like a hammer on a handle. He also has "shock absorbers" between his skull and his bill.

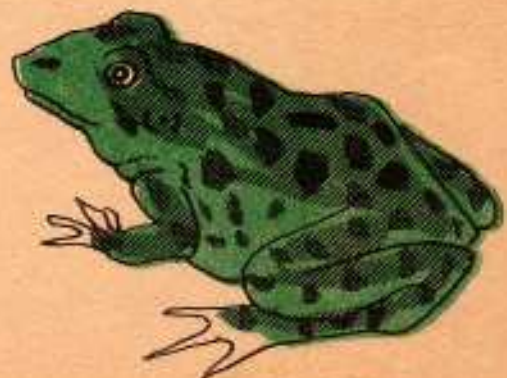


## DO YOU KNOW . . .

1. THE JELLYFISH is made almost entirely of water.
2. THE STARFISH is alike on all sides and doesn't have a head.
3. THE CATFISH, or *Synodontis Bate-soda*, a native of the river Nile, floats and swims upside down.
4. THE SMALLEST FISH in the world is the Smarapan. It is found in lakes on the island of Luzon. It weighs half a grain.
5. The CODFISH lays 8,000,000 eggs during a season of which only 2 come to maturity.
6. THE MERRIEST ANIMAL of the sea is the Dolphin. It has over 100 teeth.
7. THE COMMON FROG is the one fish that grows into an animal.
8. FLYING FISH can scale through the air over 500 feet.



JELLY FISH



FROG



## DO YOU KNOW . . .



CORAL  
SNAKE —



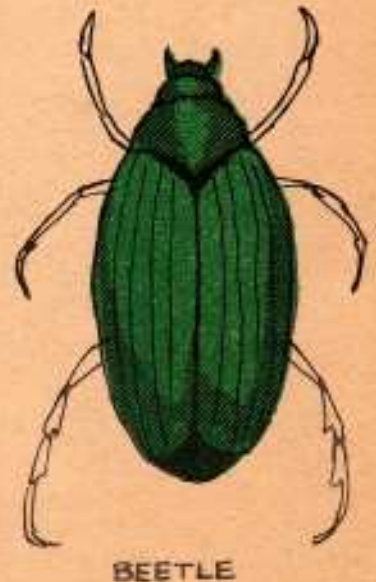
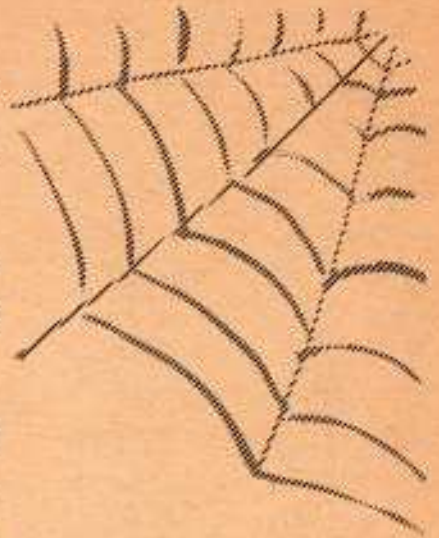
SNAKE  
WITH ITS' EGGS

1. THE KING COBRA OF SIAM, is the most poisonous living thing. Its bite can kill in less than an hour. It eats nothing but other snakes.
2. RATTLE SNAKES DO NOT SHAKE RATTLES to warn its victims. The rattle is caused by the snake's movements.
3. THERE ARE 1700 species of snakes. Some lay eggs while others bring forth living young.
4. SNAKES ONCE HAD FOUR LIMBS, the remnants can still be seen.
5. SNAKES CAST THEIR SKINS several times a year.
6. BOA CONSTRICTORS squeeze their victims to death.
7. SNAKES DO NOT STEAL milk from cows.
8. HOOP SNAKES do not take their tails in their mouths and roll down the path.
9. PYTHONS LAY OVER a hundred eggs at a time. Not all of them will hatch.
10. THE PILOT SNAKE DOES NOT WARN the rattlesnake of approaching danger.
11. THE AFRICAN COBRA or ringhals, shoots its venom at its victim from a distance. It's deadly accurate.
12. BABY RATTLES DO NOT HAVE A RATTLE, they have a "button" at the end of their tails.
13. GRASS SNAKES WILL NOT MEND, once their bodies have been broken.
14. THE UGLIEST SNAKE IN THE WORLD is the Gabun viper of Africa.



## DO YOU KNOW . . .

1. THE FEMALE SPIDER EATS her own bridegroom.
2. THE HONEYBEE moves its wings at the rate of 11,400 strokes a minute; the wasp at 6,600, and the cabbage butterfly at 540.
3. THE BULL-DOG ANT of Australia, when cut in two, each half of its body fights with the other half.
4. THE DEER BOTFLY CAN TRAVEL at the rate of 818 miles an hour or 13 miles a minute.
5. THE INSECT IN THE MEXICAN JUMPING BEAN is what makes it jump.
6. WASPS PARALYZE THEIR VICTIMS with their sting then put them in "cold storage" until needed.
7. BEETLES WALK AND SWIM at the same time, in the same place.
8. FLEAS CAN JUMP 150 times their own height.
9. ONLY THE QUEEN BEE survives more than one summer. The other bees die off as soon as their work is finished.
10. BUTTERFLIES MIGRATE TO WARM climates like birds.
11. BEES ARE BAROMETERS and can foretell a brewing storm. When this happens they drop their work and hurry back to the hives.
12. MILLIONS OF BACTERIA CAN LIVE IN COMFORT on the head of a single pin.





## DO YOU KNOW . . .



GRASSHOPPER



CICADA



FLY



MOSQUITO

1. THE GRASSHOPPER IS A FIDDLER. He uses his stiff wings as a fiddle and his hind legs as bows.
2. THE NOISIEST INSECT IN THE WORLD is the cicada. It drums on the dried crisp skin of its stomach.
3. THE FEMALE MOSQUITO IS THE ONLY mosquito that stings. She does this by inserting 6 tiny sharp needles into her victim. The female also lays one hundred and sixty billion eggs in season.

THERE ARE BETWEEN 300 and 400 different kinds of mosquitoes, and practically no part of the world is entirely free of them.

4. THE HONEYBEE COMBS ITS EYES, by using the stiff straight hairs on its front legs.
5. ANTS MAKE LIVING STOREROOMS of their own bodies. They sip "honeydew" until they are three times their normal size, then suspend themselves from the ceilings of their nests.
6. THE SILKWORM'S EGGS ARE SO SMALL that it takes 40,000 of them to make an ounce.
7. A SILKWORM'S APPETITE IS SO BIG that in 56 days it consumes food equal to about 86,000 times its own weight.



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